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Designing a Web-Based Information System for Green Open Space Utilization Services

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Abstract. The development of an information system in this study was carried out to meet the needs of the Sidoarjo Regency Environment and Sanitation Agency (DLHK) for an integrated system. More specifically, this web-based system was designed to handle services related to the use of Green Open Spaces (RTH), which until now have been dependent on manual processes and have lacked data integration. This condition has the potential to hinder the optimization of management, supervision, and service quality. In building the system, the researchers chose the Waterfall method. The reason is that this method provides clear and sequential stages. We went through these stages, starting from analyzing user needs at DLHK, then designing the system and database, then programming using a specific language, then testing the system, and finally preparing maintenance documents. To ensure that the system runs well, two types of tests were conducted. The first test was a Black Box functional test with 27 scenarios created based on use case schemes. The second test was a User Acceptance Test (UAT) involving potential users to fill out questionnaires. The results of this series of tests were encouraging. In the Black Box test, 96.3% of the functions were recorded as successful. According to the researchers, this figure shows that almost all core features are functioning optimally. Meanwhile, in the UAT, the user satisfaction score reached 91%. Based on our interpretation, this score falls into the "very satisfied" category and proves that the system is well received at the end-user level.

Keywords: Green Open Space, DLHK, Sidoarjo Regency, Information System, Waterfall

1 Introduction

Green Open Space (GOS) is a vital ecological instrument in urban spatial structure. Conceptually, GOS is defined as an elongated or clustered area that is open for use, where plants grow, either naturally or through human intervention, taking into account aspects of water absorption, economy, and aesthetics [1]. As the "lungs of the city," RTH has an important function in reducing pollution levels. It does this by absorbing CO_2 gas in the air, thereby maintaining the stability of the atmospheric environment [2] . In addition to its ecological function, RTH also has an equally important social role. RTH provides an inclusive space that allows for more free and open interaction between residents [3].

Legally, the classification of RTH is regulated by the central government through Ministerial Regulation on Agrarian Affairs and Spatial Planning No. 14 of 2022. In this regulation, green spaces are formally divided into two types, namely private green spaces and public green spaces. While private green spaces are managed by institutions or individuals for internal purposes, public green spaces such as city parks and green belts are the responsibility of local governments and are intended entirely for the public good. In Sidoarjo Regency, the need for Public RTH is increasingly urgent in line with the rapid population growth. As the main buffer zone for the city of Surabaya, the population of Sidoarjo has reached 2,027,874 in December 2024 [4]. This population surge has linearly increased the demand for adequate public spaces for social, sports, and recreational activities.

The Sidoarjo Regency Environment and Sanitation Agency (DLHK), as the authorized authority, has a major responsibility in managing the use of public green spaces. However, the process of obtaining permits for the use of green spaces at the DLHK is currently still stuck in a conventional or manual mechanism. This dependence on manual procedures often causes various obstacles, ranging from unpredictable service durations, the risk of overlapping location usage schedules, to low transparency of information for the public. In the current era of digital transformation, these limitations demand technological solutions that are capable of integrating online services to create more effective and efficient governance.

Efforts to digitize green open spaces have actually been pioneered in several previous literature. The use of information technology in the management of green open spaces has been extensively studied in previous research

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with various approaches and focuses. Akbar et al. developed a mobile-based Geographic Information System (GIS) to increase community participation in providing recommendations for green open space locations in the city of Malang. The system was able to encourage public involvement, but did not yet support administrative services such as online applications for RTH utilization permits [5]. Research by Fajriansyah et al. designed a web-based urban park monitoring information system in Sidoarjo Regency that focused on reporting on the condition and damage to parks. Although it supports the monitoring function, the system is still limited to monitoring aspects and does not yet cover comprehensive green space utilization services [6]. Meanwhile, Azra analyzed the distribution of public green spaces in Sidoarjo Regency using GIS to assess the adequacy of green spaces based on applicable regulations. This study provides a comprehensive spatial overview, but does not yet provide web-based interactive services for the community [7].

The development of a web-based green space information system was also carried out by Khaira et al. through the development of a GIS website equipped with a virtual tour feature as a medium for information and promotion of green spaces in the city of Jambi. This system focuses on the presentation of visual and spatial information, but does not yet support administrative services such as permit applications or community complaint management [8]. A similar WebGIS approach was applied in a study of green space mapping in the Bojonagara sub-district, which focused on the visualization and management of green space spatial data, but was still limited to information presentation functions [9]. From a governance perspective, Lamading et al. examined green space management from a good governance perspective and found that the aspects of participation, transparency, and accountability of local government still needed to be improved. This study emphasizes the importance of information system support in strengthening public services and coordination among stakeholders [10]. In addition, research related to GIS-based RTH availability analysis shows that spatial data plays an important role in RTH planning, but has not been integrated with online-based public service systems [11].

In a broader context, a web-based system approach has also been implemented in research on Decision Support Systems (DSS). The study used the Preference Selection Index (PSI) method to determine the priority of Green Open Space development in Makassar City [12]. Although the system has supported the decision-making process for green space management, its main focus is still limited to determining location rankings and has not integrated the aspect of green space utilization services for the community. Furthermore, Maulana and Widianto developed a web-based Geographic Information System (GIS) to manage Wiladatika Recreation Park by applying the Extreme Programming (XP) method [13]. The results of the study show that the system is effective in managing spatial data and park infrastructure. However, this system has not been designed to support administrative functions or direct public service interactions. Another relevant study was conducted by Hutama and Annisa, namely the development of a biodiversity information system in the Pindad Bandung Urban Forest. The system serves as a medium for inventorying and providing environmental information to relevant parties [14].

Based on a review of these previous studies, it can be concluded that most studies still focus on spatial mapping, monitoring, decision making, promotion, or the provision of green space information separately. To date, there has been no research specifically developing a web-based green space utilization service information system that integrates spatial data, utilization permit applications, scheduling, and community complaint management into a single integrated service platform under local government management. Therefore, this study aims to fill this gap by designing a Green Space Utilization Service Information System that supports transparent, effective, and integrated public services at the DLHK of Sidoarjo Regency.

Through the design of this web-based Green Space Utilization Service Information System, it is hoped that the gap in administrative services can be overcome. This system not only makes it easier for the public to find locations and apply for permits transparently, but also provides an instrument for the DLHK Sidoarjo to conduct integrated data monitoring and evaluation [15]. With the advent of this technology, the previously rigid and manual bureaucratic process can be transformed into a more responsive and accountable public service.

2 Method

2.1 System Development Method

The system development stage in this study follows the Waterfall method, a classic model that emphasizes a fixed sequence of stages. The process begins with needs analysis, followed by design, implementation, testing, and maintenance—without any iteration back to the previous stage. This method was chosen after assessing that the user requirements specifications for the RTH service system were definitive and did not experience significant fluctuations. A linear approach such as Waterfall is considered most appropriate to ensure consistency and discipline in the system development process in accordance with the requirements set at the outset.

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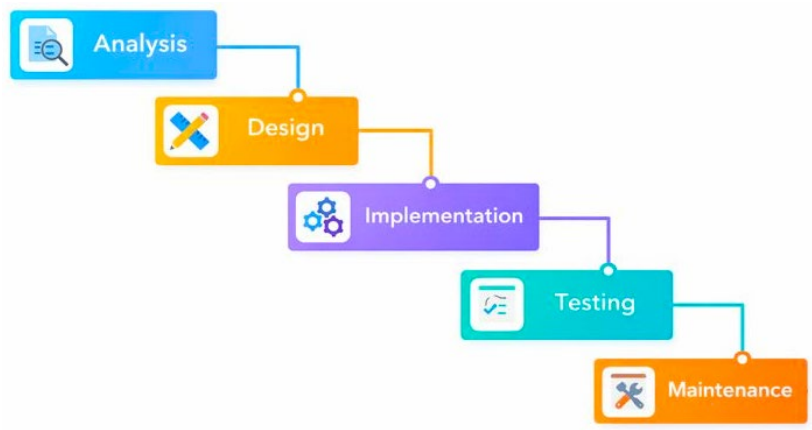

Figure 1 *Waterfall* Method

The Waterfall model consists of several main stages, namely requirements analysis, system design, implementation, testing, and maintenance [2]. The system development flow using the Waterfall method is shown in Figure 1.

3 Results and Discussion

3.1 Requirement Analysis

The requirements analysis stage was conducted to identify user requirements and the functions of the green space utilization service system at the Sidoarjo Regency Environment and Sanitation Agency. Data collection was carried out through observation, interviews, and documentation studies. The results of this stage are system requirement specifications that include main functions, such as submitting permits for green space utilization, scheduling green space usage, and reporting complaints, as well as non-functional requirements related to system security and ease of access.

3.2 System Design

The system design phase was carried out based on the results of the requirements analysis. The design includes the preparation of system flows, process modeling using flowcharts, Data Flow Diagrams (DFDs), and Entity Relationship Diagrams (ERDs), as well as database design [16]. In addition, a user interface was also designed to support permit application services, complaints, and data management by administrators, supervisors, and leaders.

3.2.1 Flowchart

The flowchart in Figure 2 is used to illustrate the flow of the web-based Green Open Space (RTH) utilization service process at the Sidoarjo Regency Environment and Hygiene Agency [18]. The system flow begins when the user accesses the application, then registers or logs in according to their account status. After successfully logging in, users can select the RTH utilization permit service or the complaint service. In the permit service, the submitted application will be verified, then proceed to the scheduling process if approved or returned to the main menu if rejected. Meanwhile, in the complaint service, the submitted report will be processed and its handling status will be displayed. The process ends when the user chooses to log out of the system.

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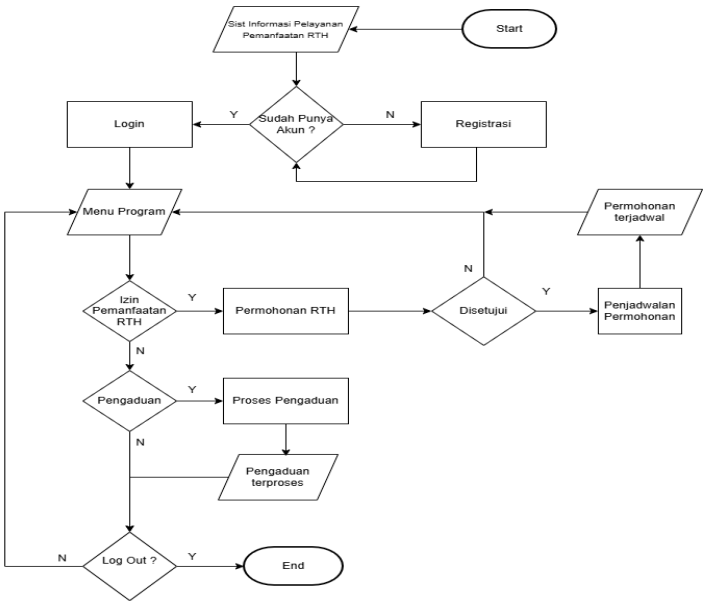

Figure 2. Flowchart

3.2.2 Data Flow Diagram (DFD)

Level 0 Data Flow Diagram (DFD) as shown in Figure 3 is used to describe the main data flow between the Green Space Utilization Information System and the external entities involved. This diagram provides an overview of data interactions without detailing the internal processes of the system [19]. Based on Figure 3.3, the system interacts with four external entities, namely Admin, User, Supervisor, and Manager. The Admin plays a role in managing green space data, green space facilities, supervisor data, and scheduling green space utilization.

In addition, the admin also processes RTH utilization permit applications and complaint reports submitted by users, including responding to complaints through the system. Users utilize the system to submit RTH utilization permit applications, submit complaints, and access information related to RTH utilization schedules, facilities, and follow-up on complaints. The processed schedule information and complaint data are then forwarded to the Supervisor as a basis for monitoring activities and handling complaints in the field, and the results are reported back to the system. Meanwhile, the Management obtains system outputs in the form of permit application and complaint information, which is used as material for evaluation and decision-making related to green space management.

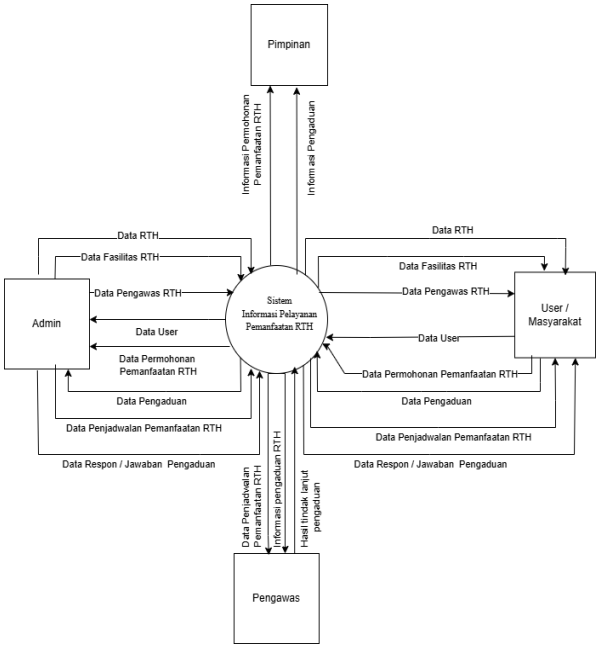

Figure 3. Data Flow Diagram Level 0

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3.2.3 Entity Relationship Diagram (ERD)

Figure 4 is an Entity Relationship Diagram (ERD) of the Green Space Utilization Service Information System used to describe the database structure and relationships between entities within the system. This ERD forms the basis for database design so that data storage and management can be carried out in a structured manner [20]. Based on Figure 3.4, the system consists of several main entities, namely Admin, Applicant, RTH, Supervisor, Facilities, RTH Utilization Permit, and RTH Complaints. The Admin entity has a management relationship with applicant data and RTH data. Applicant is an entity that has a submission relationship with the RTH utilization permit and RTH complaint entities, where one applicant can submit more than one permit application or complaint. The RTH Utilization Permit entity stores the permit application data submitted by the applicant, while the RTH Complaint entity stores the complaint report data submitted by the applicant. The RTH entity stores information on green open spaces and has a relationship with the Facility and Supervisor entities, where one RTH can have more than one facility and can be supervised by a supervisor according to management needs. This ERD design shows the interrelationship of data between entities that support the RTH utilization service process and serves as a reference in the development of the DLHK Sidoarjo Regency system database.

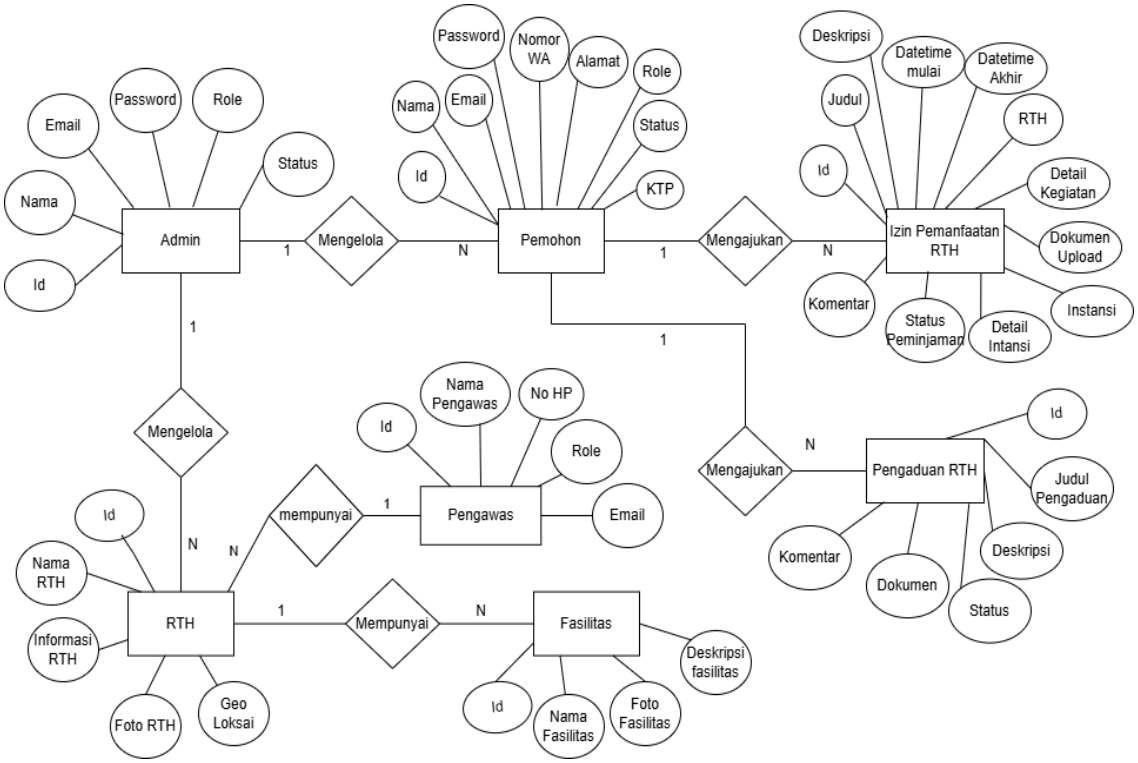

Figure 4 Entity Relationship Diagram

3.2.4 Database Table Relationship

The database table relations in Figure 5 illustrate the interrelationships between tables in the Green Open Space (RTH) Utilization Service Information System, which aims to integrate and maintain data consistency. The relations used include one-to-one, one-to-many, and many-to-many, as required by the system. The user table is the center of the relationship connected to the izin_rth and pengaduan tables with a one-to-many relationship, because one user can submit several permit applications and complaints [21]. Each permit and complaint data is only related to one user as the applicant.

The izin_rth table has a one-to-one relationship with the izin_rth_detail table and a one-to-many relationship with the izin_rth_comments table to store details and the history of the permit process. The pengaduan table has a one-to-many relationship with the pengaduan_detail, pengaduan_lampiran, and pengaduan_comments tables. In addition, the rth table has a one-to-many relationship with the facilities table and is connected to the izin_rth and pengaduan tables. The pengawas table is related to the user and rth tables to describe the assignment of supervision. The design of these relationships aims to avoid data redundancy, maintain information consistency, and support the effective and structured utilization of RTH services at the DLHK of Sidoarjo Regency.

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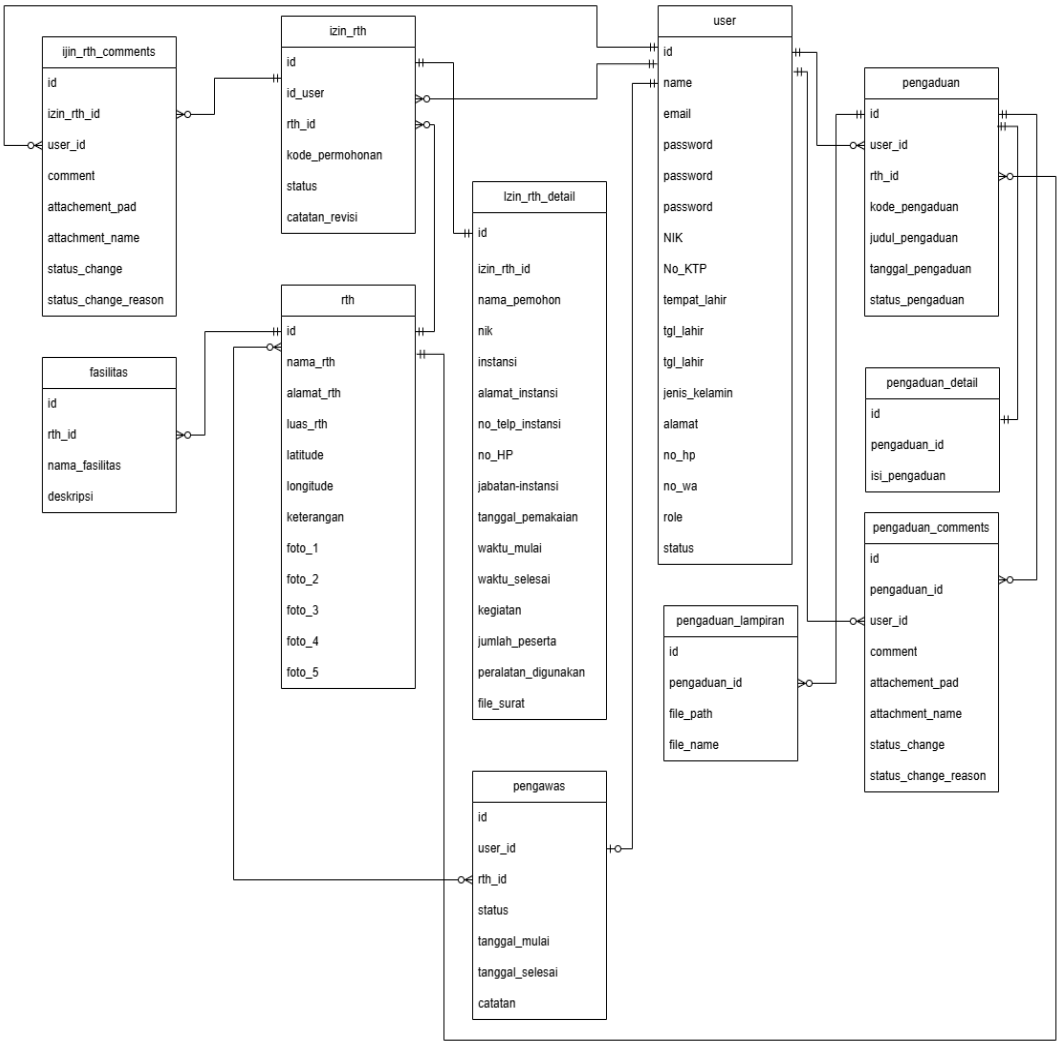

Figure 5. Database Table Relationships

3.3 Implementation

The implementation stage was carried out by translating the system design into program code. The RTH utilization service information system was developed web-based using PHP with the Laravel framework and MySQL database. The main features implemented include RTH data management, utilization permit applications, activity scheduling, complaint reporting, and presentation of RTH location information integrated with the Google Maps API.

3.3.1 Interface Display

The system interface is designed with an emphasis on functionality and usability to support transparent public services. The display design is structured to accommodate the specific needs of four access levels, namely Admin, Management, Supervisors, and the Community. Through a user-centered design approach, every visual element in the application, from data management to monitoring the status of RTH requests, is integrated in such a way that the system operates more efficiently. This is done to ensure that the delivery of information and processes can be carried out dynamically, intuitively, and in accordance with the authority limits of each user.

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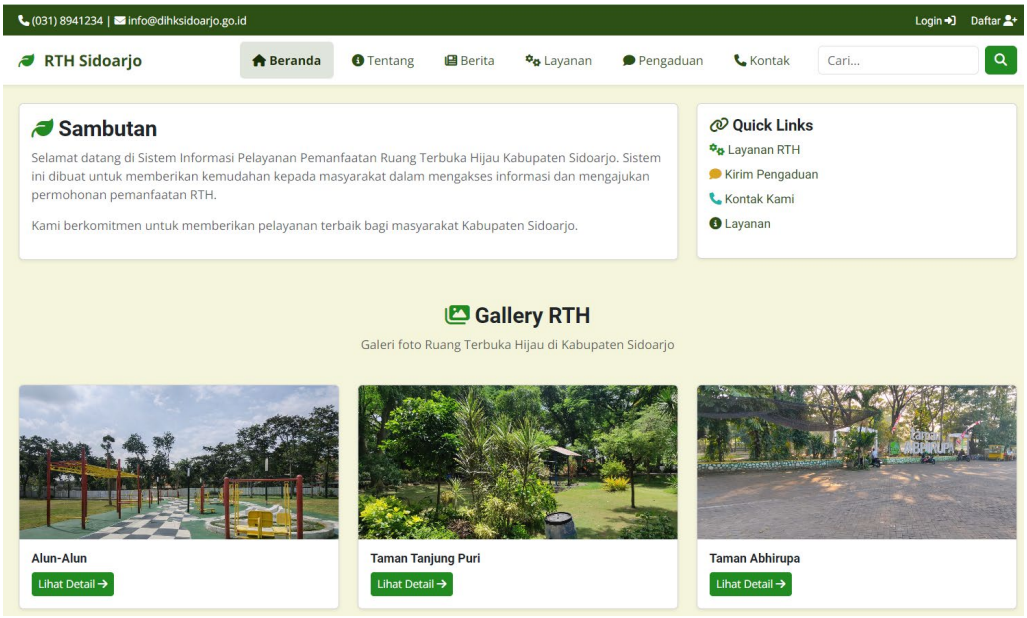

Figure 6. Home Page

Figure 6 shows the Home Page, which is the first page that appears when the system is accessed by users. This page presents various key information related to Green Open Spaces (RTH) in Sidoarjo Regency, such as a gallery of RTH photos, information on RTH locations, and a map of RTH distribution managed by the Sidoarjo Regency Environment and Sanitation Agency. The information presented on the home page can be accessed by the entire community without requiring login/authentication. The home page also provides a main navigation menu including Home, About Us, Services, Green Open Spaces, Criticism/Suggestions/Complaints, Contact Us, and Login. This navigation menu is designed to make it easier for users to access the information they need. The homepage also features a search bar to quickly find information. The Login feature is provided for visitors or members of the public who wish to apply for a permit to use green open spaces or submit complaints related to green open space issues. In addition, the login menu is also used by internal parties, such as administrators, supervisors, and leaders, to log into the system according to their respective access rights and authorities.

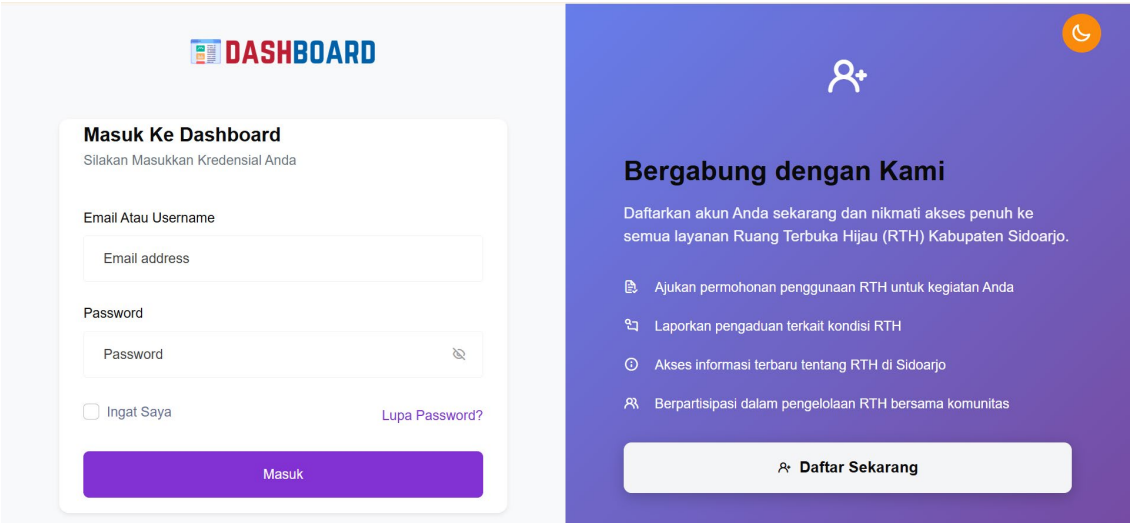

Figure .7 Login Page

Figure 7 shows the Login Page, which is the main entry point for users who want to access internal services from the Green Open Space Utilization Information System (RTH). On this page, users are asked to enter their username or email address and password that they registered previously. These input components are used for user data authentication and validation so that only those with access rights can enter the system. In addition to the login form, this page also features a "Forgot Password?" link to help users who have forgotten their password, as well as a "Sign up" option for new users who want to register an account to access RTH utilization services.

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This login feature is not only intended for members of the public who wish to apply for an RTH utilization permit or submit a complaint, but is also used by internal parties such as administrators, supervisors, and leaders. Each role has a different level of authorization in accordance with their authority and responsibilities.

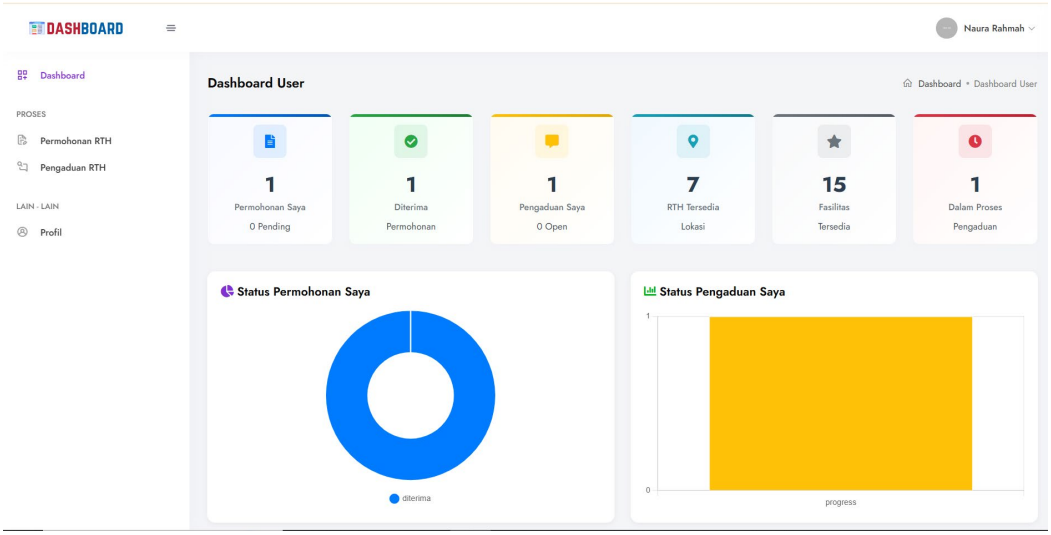

Figure 8. User Dashboard

Figure 8 shows the User Dashboard, which is a tool for the public to independently monitor the status of Rang Terbuka Hijau services. Users can quickly view a summary of their personal data through six indicator panels, which cover everything from application status to information on the availability of public facilities. At the bottom, the graph serves as a transparency tool that makes it easy for citizens to track the progress of their reports and see how far they have been processed by the admin. Based on its design, this interface was created with the aim of facilitating communication between the public and the government so that public services can be more informative and effective.

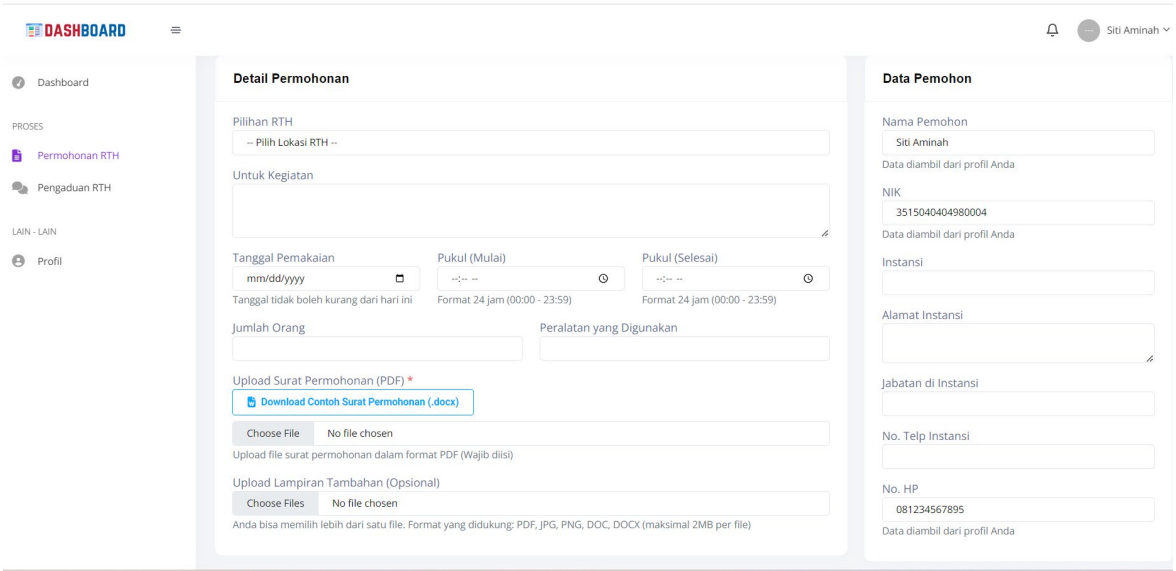

Figure 9. Application Input Page for RTH Utilization Permit

Figure 9 shows the RTH Utilization Permit Application Input Page, which is one of the main features in the Green Open Space (RTH) utilization service information system used by the community or agencies to submit RTH utilization permit applications. This page consists of two main sections, namely Application Details and Applicant Data, which must be completed before the application is submitted. In Application Details, users must input the location of the RTH being applied for through the "Select RTH" dropdown menu. Applicants must also

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complete a description of the activity, fill in the date of use, and input the start and end times of the activity. Applicants are also required to list the number of participants and the equipment to be used.

The system also provides a feature to upload application documents in PDF format as proof of validity. In the Applicant Data section, personal identity information such as the applicant's name, NIK, and contact number will be automatically filled in by the system based on the data obtained during account registration. Thus, applicants do not need to re-enter their personal identity information. Applicants only need to complete additional information such as the name of the agency, agency address, position in the agency, and agency telephone number. After all the application data has been filled in correctly, applicants can submit their request by pressing the "Submit Application" button. The submitted data will be entered into the system for further verification by the Sidoarjo Regency Environment and Sanitation Agency before a decision is made on whether the application is approved or rejected.

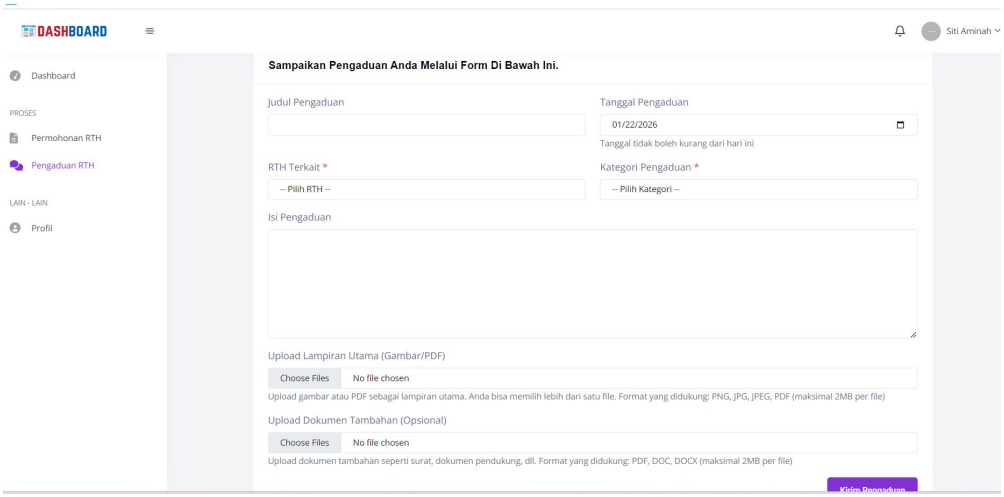

Figure 10 RTH Complaint Input Page

Figure 10 shows the RTH Complaint Input Page, which is designed as a means for the public to submit reports, complaints, or suggestions related to RTH management in Sidoarjo Regency. The interface of this page consists of several main components, namely the Complaint Title column for writing a summary of the problem, the Complaint Details column for providing a detailed description of the complaint, and the Upload Attachment feature that allows users to attach evidence in the form of images or documents (PDF) with the option of more than one file. Meanwhile, the Complaint Date will be automatically displayed by the system according to the time of filling in so that users do not need to input it manually. Once all the data has been completed, users can submit the report via the Submit Complaint button, and the system will automatically save and forward the data to the Sidoarjo Regency Environment and Sanitation Agency for verification and follow-up.

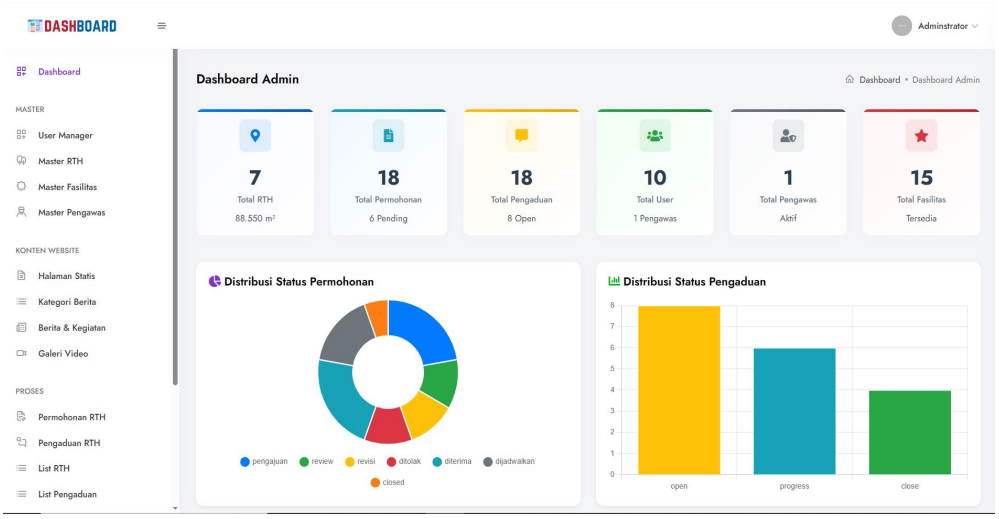

Figure 11 Admin Dashboard

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The interface visualization in Figure 11 represents the Admin Dashboard as an integrated control center that consolidates all Green Open Space (RTH) management data into a single digital monitoring framework. Through the indicator panel at the top, the system explicitly presents quantitative metrics, including the total area of green open space covering 88,550 m² and the availability status of 15 supporting facilities, which are crucial for administrators in conducting real-time asset audits. Furthermore, the distribution graph of requests and complaints is not merely a visual ornament, but an evaluation tool to measure responsiveness to public needs, from the input stage to the final resolution. With a hierarchical navigation structure, this interface effectively supports data-driven decision making to ensure that the ecological and social functions of RTH are optimally maintained.

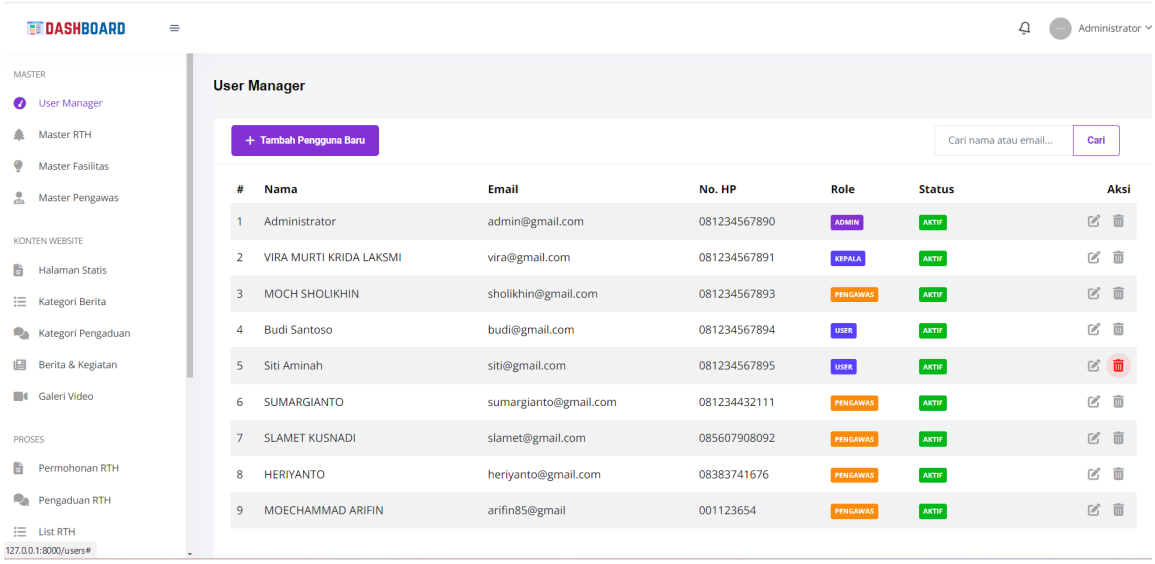

Figure 12. User Manager Page

Figure 12 shows the User Manager Page, which functions to manage user data. This page displays a list of users complete with information such as name, email, mobile phone number, role, and account status. Admins can add new users, edit data, and reset passwords. There is also a search field to make it easier to find the desired data.

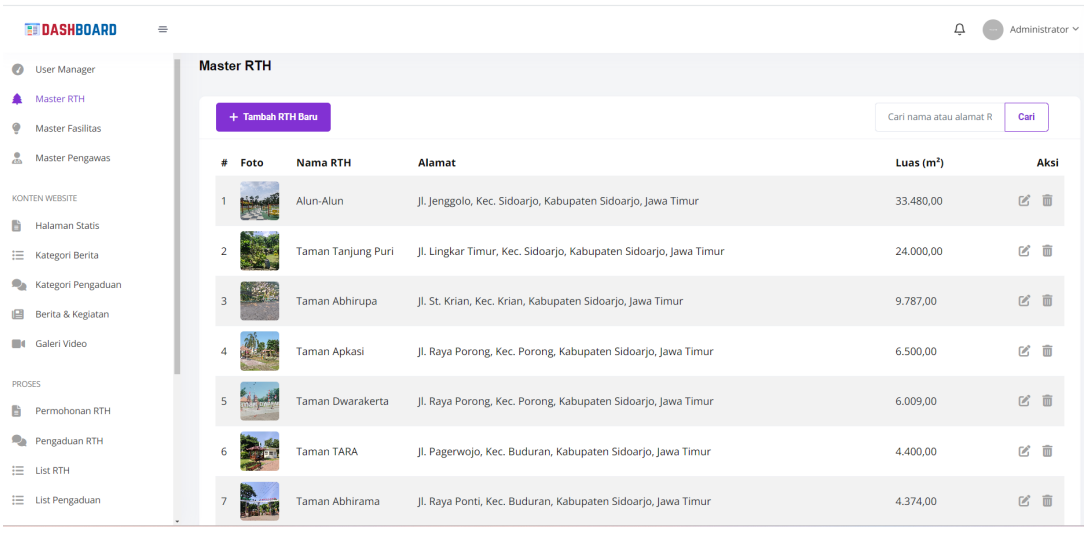

Figure 13. RTH Master Data Page

Figure 13 is the RTH Master Data Page, which displays all Green Open Space data that has been entered into the system. Admins can add, view, edit, and delete unnecessary RTH data.

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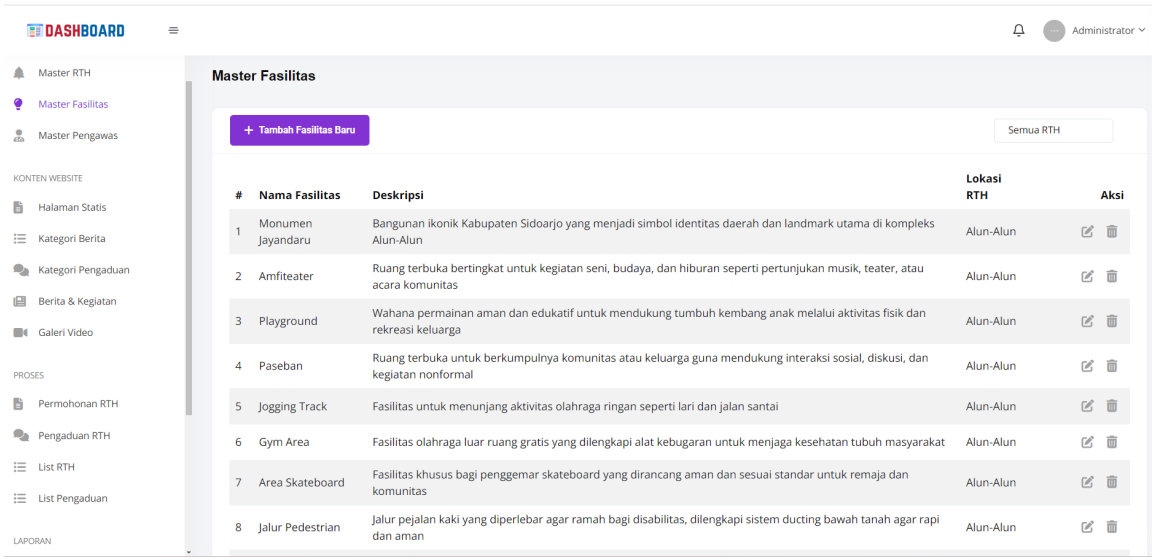

Figure 14: RTH Facility Master Data Page

Figure 14 shows the RTH Facility Master Data Page, displaying all RTH facility data that has been entered into the system. On this page, administrators can add, view, edit, and delete facility data for each RTH. Administrators can also filter facilities based on specific RTH locations to facilitate management.

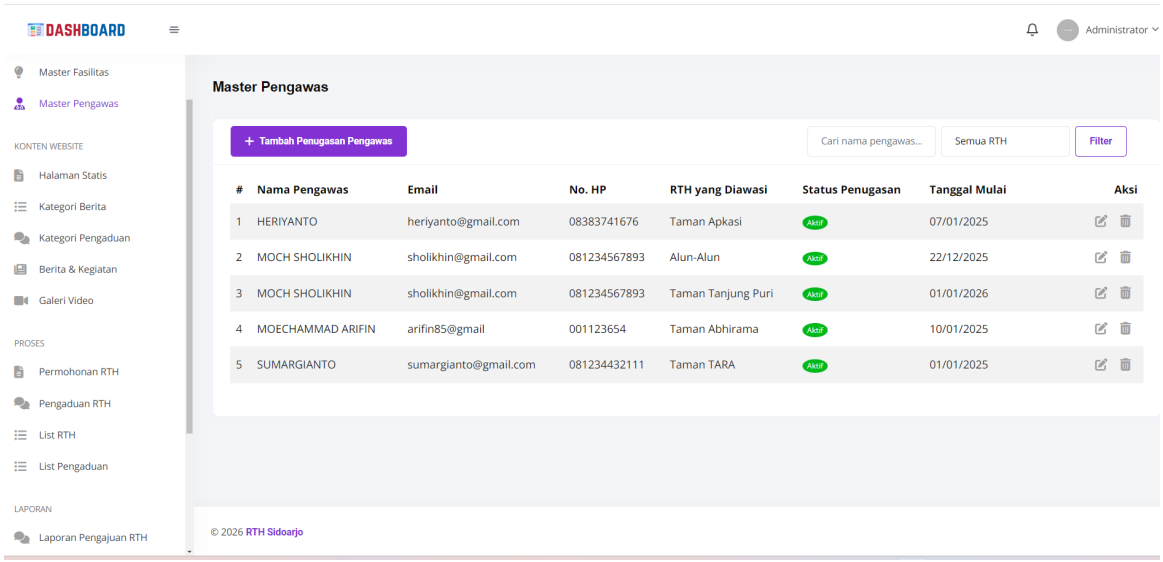

Figure 15. RTH Supervisor Master Data Page

Figure 15 shows the RTH Supervisor Master Data Page, which displays all RTH supervisor data that has been entered into the system. Admins can add new supervisor data, edit, or delete existing data. There is also a search and data filter feature to facilitate searching for supervisor data based on name or location of the RTH being supervised.

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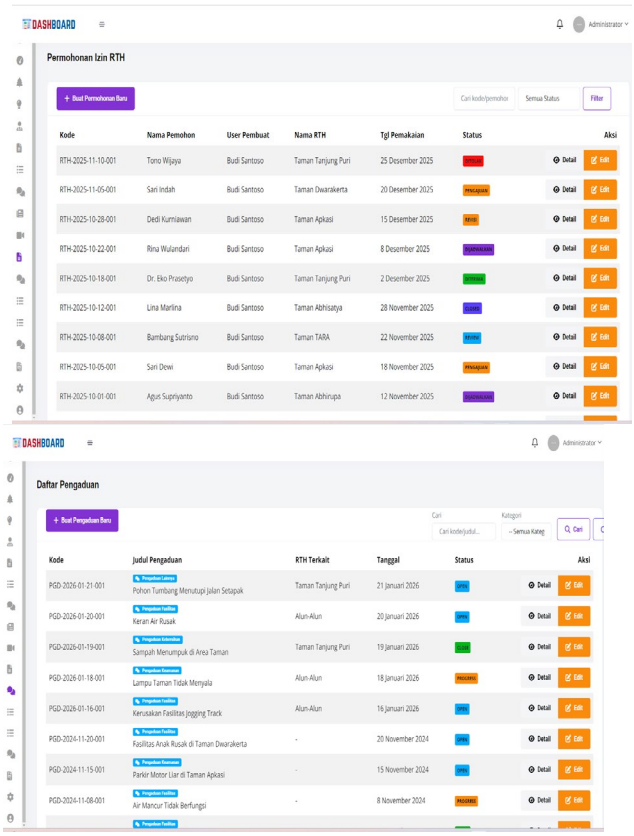

Figure 16. Permit Application List Page and RTH Complaint List Page

3.4 System Testing

System testing is conducted to ensure that all functions run according to the specified requirements. The testing method used is Black Box Testing, which focuses on the conformity of inputs and outputs in each system feature [17].

3.4.1 Black Box Testing

Black Box Testing is a software testing method that focuses on system functionality without having to examine the program code structure [22]. The main function of this method is to ensure that the system can accept input and provide output in accordance with user requirements.

In this study, testing was conducted on all main modules of the system, ranging from the management of green space data, facilities, and supervisors, to the process of applying for utilization permits and reporting complaints. The author tested each function by providing valid and invalid input scenarios to see the extent to which the system was able to provide the correct response, including in handling data entry errors. The following are the results of Black Box Testing on the RTH Utilization Service Information System:

Table 1. Black Box Testing

No	Feature Tested	Input	Expected Output	Test Results
1	User Login	Enter the correct username and password	The system displays the dashboard according to the user's role (admin/supervisor/community/leader)	Successful
2	Login Failed	Enter the incorrect username or password	The system displays the message "Incorrect username or password"	Success
3	RTH Data Input	Fill in all data in the RTH form correctly	Data is saved and appears in the RTH list	Success
4	RTH Data Validation	One of the required fields is empty	The system displays a warning message that the required field must be filled in	Success

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5	Edit RTH Data	Make changes to stored RTH data	Data changed according to updates	Success
6	Delete RTH Data	Press the delete button on one of the RTH data	Data deleted from the list	Success
7	Input RTH Facility Data	Fill in all data in the RTH facility data form correctly	Data saved and appears in the RTH facility list	Success
8	RTH Facility Data Validation	One of the required fields (e.g., facility name) is left blank	The system displays a warning message that the required field must be filled in	Success
9	Edit RTH Facility Data	Making changes to stored RTH facility data	Data changed according to updates	Successful
10	Delete RTH Facility Data	Press the delete button on one of the RTH facility data	Data deleted from the list	Success
11	Input RTH Supervisor Data	Fill in all data in the RTH Supervisor data form correctly	Data saved and appears in the RTH Supervisor list	Success
12	RTH Supervisor Data Validation	One of the required fields (e.g., supervisor name) is left blank	The system displays a warning message that the required field must be filled in	Success
13	Edit RTH Supervisor Data	Making changes to stored RTH Supervisor data	Data changed according to updates	Successful
14	Delete RTH Supervisor Data	Press the delete button on one of the RTH Supervisor data entries	Data deleted from the list	Success
15	Input RTH Utilization Request	Community users submit RTH utilization requests via a form and upload a letter	Application data is saved and appears in the admin/manager account	Successful
16	RTH Utilization Application Validation	One of the required fields is empty (e.g., date of use)	The system displays a warning message that the required field must be filled in	Success
17	Edit RTH Utilization Application Data	Making changes to the stored RTH Utilization Application data	Data changed according to updates	Successful
18	Delete RTH Utilization Application Data	Press the delete button on one of the RTH Utilization Application data	Data deleted from the list	Success
19	Verify RTH Utilization Application	The administrator verifies the application and changes the status to "Approved" or "Rejected"	The status of the application changes according to the admin's action	Successful
20	Green Space Complaint	The user fills out the complaint form and submits it	Complaint data is stored and displayed on the admin, manager, and supervisor pages	Successful
21	RTH Complaint Validation	Leaving one of the required fields blank (e.g., complaint details)	The system displays a warning message that the required field must be filled in.	Success
22	Edit RTH Complaint Data	Making changes to saved RTH Complaint data	Data changed according to updates	Successful

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23	Delete RTH Complaint Data	Press the delete button on one of the RTH Complaint data	Data deleted from the list	Success
24	Initial response to complaint	The administrator provides an initial response to the complaint received and changes the complaint status to "in progress."	The initial response is saved and displayed on the user/community page.	Successful
25	Follow-up on Complaints	The supervisor or admin provides a follow-up response to the complaint report	Follow-up response is saved and displayed on the user/community page.	Successful
26	Reports & Charts	Administrators or managers open the complaint/request report menu	Report data and graphs are displayed according to the selected period	Failed
27	Logout	The user clicks the logout button	The system returns to the login page	Successful

$$Tingkat\ Uji\ Keberhasilan = \frac{Eksperimen\ Sukses}{Total\ Unit\ Uji} \times 100\%$$

$$Tingkat\ Uji\ Keberhasilan = \frac{26}{27} \times 100\%$$

$$Tingkat\ Uji\ Keberhasilan = 96{,}3\ \%$$

Black Box Testing on the Green Open Space Utilization Service Information System (RTH) was conducted by the author by directly testing all the main functions in the system. System testing involved four different user roles, namely admin, supervisor, community, and leadership, to ensure that each process flow could be tested according to their respective access rights. This was done to verify that the system could actually operate according to the needs of RTH utilization services.

The results of testing 27 test scenarios showed that the majority of system functions produced outputs that were in line with expectations. Of all the features tested, 26 features functioned properly, while one feature, namely the presentation of reports and graphs, failed due to technical constraints in the data filtering process. Thus, the system's functionality success rate reached 96.3%. In general, the system was able to handle the login process correctly, validate input, and store and update data according to user roles. In addition, the main flow, such as RTH utilization requests, complaints, verification, and follow-ups, also ran well, with no significant functional errors found. It can be concluded that the RTH Utilization Service Information System has fulfilled its basic functionality and is ready to be used to support services and supervision at the DLHK of Sidoarjo Regency.

3.4.2 User Acceptance Testing

After ensuring the functionality of the system through black box testing, the next step is to see how users respond through User Acceptance Testing (UAT) [23]. Here, the researchers want to validate whether the green space service platform that has been built is truly acceptable and convenient for the community. This test involved 10 respondents who were directly involved in the service flow at the DLHK Sidoarjo. Respondents were asked to test the system directly, including navigating the menu and trying out the complaint feature, then providing objective feedback based on their experience. The main focus was to ensure that the system not only functioned technically, but was also easy and convenient for the community to use.

Furthermore, all feedback from respondents was measured using a Likert scale. To avoid neutral or indecisive answers, the researchers chose a range of values from 1 to 4. Thus, each respondent was directed to give a clear and decisive assessment of the system’s performance. The number 1 was used to represent the lowest level of disagreement, while the number 4 indicated the highest level of satisfaction or agreement. The details of the weighting of these values can be seen in the following details:

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Table 2. User Acceptance Testing

Respondents	Number of Questions				
	1	**2**	**3**	**4**	**5**
1	4	4	4	3	4
2	4	4	4	4	4
3	4	3	3	3	3
4	3	3	3	3	4
5	4	4	4	4	4
6	3	4	3	4	4
7	4	4	4	4	4
8	3	4	4	4	4
9	4	4	4	3	4
10	3	3	3	3	3
Total	36	37	36	35	38
Total Score	182				
Maximum Score	200				
Percentage	91				

$$User\ Acceptance\ Testing = \frac{Total\ Nilai}{Nilai\ Maks} \times\ 100\%$$

$$User\ Acceptance\ Testing = \frac{182}{200} \times\ 100\% = 91\%$$

Based on the UAT results involving 10 respondents, a total score of 182 out of a maximum score of 200 was obtained. The test was conducted using five questions with a 1–4 Likert scale, where 1 indicates the lowest level of disagreement and 4 indicates the highest level of agreement. The use of this even scale aims to avoid neutral choices so that respondents' assessments can reflect the level of acceptance of the system more objectively. The calculation results show that the level of user acceptance of the green space utilization service information system reached 91%. This percentage indicates that the system has a very high level of acceptance in terms of ease of use, clarity of features, and convenience in supporting the service process at DLHK Sidoarjo, so that the system is considered feasible to be implemented as a web-based service medium.

3.5 Maintenance

The maintenance phase is carried out after the system is used, including error correction, adjustments to changing needs, and the development of advanced features to support the sustainable utilization of green space.

4 Conclusion

This web-based Green Open Space (RTH) Utilization Service Information System was developed as a solution to the problems of RTH utilization services at the Sidoarjo Regency Environment and Hygiene Agency (DLHK). Previously, the service process was still carried out manually, was not integrated, and did not support transparency. These conditions had an impact on the suboptimal licensing and complaint management processes, as well as making it difficult for related parties to conduct monitoring and evaluation. The development of this system used the Waterfall method, which includes the stages of needs analysis, system design, implementation, testing, and maintenance. The system evaluation was conducted through functional testing using the Black Box Testing and User Acceptance Testing (UAT) methods, which utilized questionnaires. The results of the Black Box Testing on 27 test scenarios showed a success rate of 96.3%, indicating that most of the system functions were running according to the specified requirements. In addition, the UAT results involving 10 respondents with 5 assessment indicators showed a user satisfaction rate of 91%, so it can be concluded that the system was well received by users. Based on these test and evaluation results, this web-based Green Space Utilization Service Information System is considered capable of overcoming the problems of green space utilization services at the DLHK of Sidoarjo Regency. This system can improve the effectiveness, efficiency, and transparency of services, as well as facilitate data management, monitoring, and decision-making processes. Therefore, this system is suitable to be implemented as a supporting tool for green open space utilization services in Sidoarjo Regency.

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